TAXONOMIC NOTES ON THE ORDER EMBIOPTERA.

I. THE GENOTYPE OF OLIGOTOMA WESTWOOD.

By Consett Davis, M.Sc., Lecturer in Biology, New England University College, Armidale.*

(Five Text-figures.)

[Read 26th April, 1939.]

Much of the material for this and subsequent papers was gathered overseas, when the types of many species were examined in the United States, England and France, and those of other species were obtained on loan from several European museums. Sufficient data were obtained to justify a detailed consideration of the taxonomy of the Order as a whole, in a series of papers of which this is the first. This paper is presented first to enable other workers to use the facts contained herein. The two species here considered have long been known by incorrect names, and, in addition to the fact that one is the genotype of *Oligotoma*, there is the consideration that both are exceedingly common in nearly all the warmer countries of the world.

Genus Oligotoma, 1837.

Trans. Linn. Soc. Lond. (Zool.), xvii, p. 373 (as subgenus of *Embia* Latr.); genotype *O. saundersii* Westw., l.c. Raised to generic rank by Burmeister (1839).

Oligotoma saundersii Westwood, 1837, l.c.

Westwood's type is in the Hope Department of Entomology, Oxford University. It is a carded specimen in fair condition, with the mandibles dissected out and mounted on a separate card. The labels below this specimen are: (1) 'Embia (Oligotoma) saundersii West. in Trans. Linn. Soc.'; (2) 'W. S. Saunders. East Ind.'; and (3) a blue rhomboidal label with the letter 'W', Westwood's equivalent to a type label.

Preparation of the terminalia of this specimen immediately revealed that the species known to Krauss (1911), Enderlein (1912) and subsequent workers as *Oligotoma saundersii* (misspelt *saundersi* in some cases) is not conspecific with Westwood's type. Westwood's specimen is conspecific with examples determined by Enderlein (l.c.) as *Oligotoma latreillei* (recte *latreillii*) (Rambur, 1842). The name *latreillii* (Ramb.) must be added to the synonymy of *Oligotoma saundersii* Westw., both referring to the series so long referred incorrectly to *O. latreillii* (Ramb.).

The species known to Enderlein (l.c.) and other workers as *Oligotoma saundersi* must now be called by the next valid name, *Oligotoma humbertiana*

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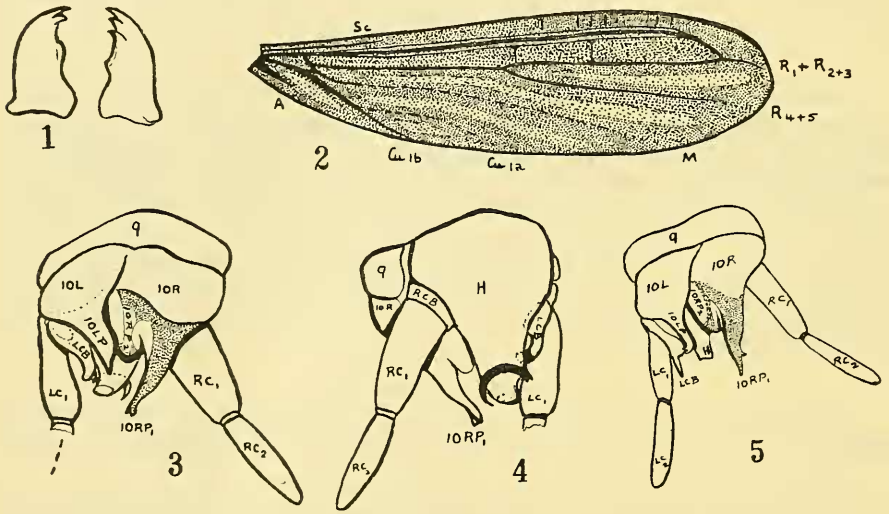
(de Saussure, 1896). The following description of *O. saundersii* is from Westwood's type (♂).

Dimensions: Length of body 7 mm.; forewing 5 mm. × 1·4 mm.; hindwing 4 mm. × 1·4 mm. General colour pale chocolate brown; bands bordering wing-veins or their traces pale brown; veins darker brown. Dimensions and form of head not discernible, on account of dissection. Mandibles (fig. 1) rather slender, incurved distally, with a terminal acute tooth, the left with two subterminal teeth, the right with one; each mandible with a blunt projection midway along the inner margin, representing the basal end of the cutting edge. Body sclerites, except the terminalia, normal for winged specimens of the Order. Wings with subcosta reaching to one-quarter the length of the wing; R_1 strong, bordered by fine dark lines, confluent subterminally with R_{2+3}, the fused vein reaching the termen.



Figs. 1-4.—*Oligotoma saundersii* Westwood, holotype ♂.—1. Mandibles, ventral view, × 33.—2. Right forewing, × 13, conventional lettering for venation.—3. Terminalia from above, × 33.—4. Terminalia from below, × 33 (9, ninth abdominal tergite; 10L, 10R, left and right hemitergites of tenth abdominal segment; $10RP_1$, $10RP_2$, outer and inner processes of 10R; 10LP, process of 10L; H, hypandrium (ninth abdominal sternite); LCB, RCB, left and right cercus-basipodites; LC_1, first segment of left cercus; RC_1, RC_2, first and second segments of right cercus).

Fig. 5.—*Oligotoma humbertiana* (Sauss.) ♂, Mt. Makilling, Luzon, Philippine Isds., terminalia from above, × 30. Lettering as in figs. 3-4; LC_2, second segment of left cercus. (All figures based on camera lucida outlines; all setae omitted.)

R_s forking to R_{2+3} and R_{4+5} midway along the wing; R_{4+5} simple, becoming obsolete before the margin. M represented only by a row of hairs and by the pigment-band normally bordering each vein or its trace in this Order. Main stem of Cu_1 strong, reaching the margin; its anterior branch (Cu_{1a}) no stronger than M. Anal vein short but distinct. Some five weak cross-veins between C and R_1, and two stronger between R_1 and R_{2+3}. All veins, or (if obsolescent) their traces, with broad pigment-bands, the hyaline areas between being narrow longitudinal streaks (fig. 2).

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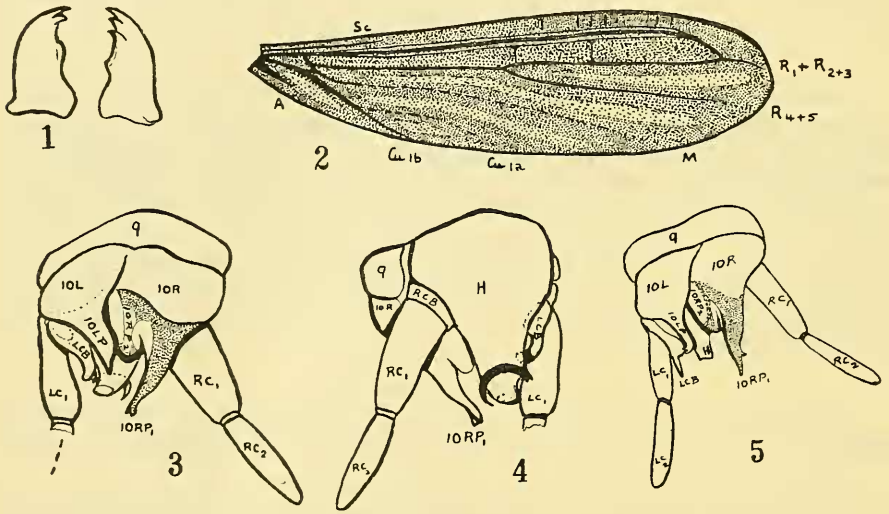

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Terminalia (figs. 3, 4) with tenth tergite divided to left (10L) and right (10R) hemitergites, the suture between which tends to become obsolete proximally. Right hemitergite with its outer margin produced backwards and inwards to a slender sinuous process ($10RP_1$), ending in two teeth, the outer blunter and more dorsally placed, the inner sharper and more ventral. The inner part of $10RP_1$ basally overlies another flap-like process ($10RP_2$), the medial chitinization of which is a continuation of the chitinization of $10RP_1$. Left hemitergite produced backwards to a cultriform process (10LP), acutely tapered. Right cercus of two subequal subcylindrical segments, the first (RC_1) somewhat thicker. Left cercus of similar form, the first segment (LC_1) very slightly clavate, the second broken. Rudimentary subannular cercus-basipodite (RCB) ventrally at base of right cercus; left cercus-basipodite (LCB) well developed, tapered, curved outwards, ending obtusely. Ninth sternite (H) tapered, curved to the left, truncate distally, with a trace of a tubular structure dorsally. A slender, heavily-chitinized spine arises subterminally from the left margin of the ninth sternite, with two minute teeth at its point of origin; the spine curves to the right under the end of the sternite, projecting upwards and backwards terminally.

The above description and figures are based on an old specimen which, being the type, could not be fully dissected; it cannot therefore be as full as many other descriptions which have been based on well-preserved series, and published from time to time under the name *Oligotoma latreillei*. It is given in detail to obviate any criticism of the identity of Westwood's type. Fuller descriptions, under the name *O. latreillei*, have been given by Enderlein (1912), Okajima (1926), Menon and George (1936) and Davis (1936), and by Krauss (1911) under the name *O. hova* (Sauss.). Additional morphological points, not included in the description of the type, are that only one bladder is present on the first tarsal segment of the hind legs, and that the first abdominal sternite is much reduced. The second segment of the left cercus is subequal to that of the right in most examples.

The following species may now be listed as synonyms of *O. saundersii* Westw.:

O. latreillii (Rambur).—*Embia latreillii* Rambur, *Hist. nat. Névroptères*, 1842, p. 312. Enderlein's description and figures of *O. latreillii* (l.c.) are not from the type; he had, however, examined Rambur's type in the de Selys collection, so that the synonymy may be taken as established.

O. insularis M'Lachlan, 1883, *Ann. Mag. Nat. Hist.* (5), vol. 12, p. 227.—The identity of M'Lachlan's species with that previously known as *O. latreillei* has been suggested by several authors (e.g. Enderlein, 1912; Navás, 1918*a*; Friederichs, 1934, 1935), without examination of the types. In the M'Lachlan collection (British Museum of Natural History) are M'Lachlan's three original types, each labelled 'Oligotoma insularis M'Lach.'; 'Type'. Preparation of the terminalia of one of these, and examination without preparation of the others, left no doubt that *O. insularis* is an absolute synonym of *O. saundersii* as defined above.

Oligotoma cubana Hagen, 1885, *Canad. Entomologist*, vol. 17, p. 141. (Used as a nomen nudum, Hagen, 1866, p. 221 (*Olyntha cubana*) and by M'Lachlan, 1877, p. 381.) Hagen's type is in the Museum of Comparative Zoology, Harvard University. Preparation and examination of its terminalia showed it to be a normal specimen of *O. saundersii* Westw. The synonymy has not previously been proved by reference to the type.

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Krauss (l.c.) used the name *O. hova* for this series, believing that *O. saundersii* and *O. latreillii* both stood for the species known to Enderlein by the former name, and now rightly to be known as *O. humbertiana* (Sauss.). It is evident from a later paper (1917) that Krauss then followed Enderlein in applying the name *O. latreillii* to the insect now under discussion, and using *O. saundersii* in Enderlein's sense.

Oligotoma bramina (de Saussure)—*Embia bramina* de Saussure, l.c., p. 352.—Krauss (1911, Pl. i, figs. 6, 6A) has figured the type (Mus. Geneva), and allows it as a different species from *O. hova*. Although de Saussure and Krauss, with the specimens before them, recognized *O. hova* and *O. bramina* as distinct, I believe that they are to be considered conspecific, the type of *O. bramina* being perhaps individually aberrant. The locality is Bombay, India, where *O. saundersii* (= *O. hova*) occurs; and there are no existing descriptions of insects from this region to support the belief that *O. bramina* exists as a distinct species, although quite a number of other records of the genus for India have been published. Krauss's figure of the type of *O. bramina* shows the termination of the outer process of the right hemitergite as slightly different in form from the normal for *O. saundersii* (*O. hova*), and no process at all is shown from the left hemitergite, although actually such a process is present in all species of the genus; the omission may be due to breakage, or to failure to distinguish the structure in the unprepared terminalia. The ventral structures shown in the figure may well represent the tubular ninth sternite, curved to the left, and its associated spine, somewhat distorted. As Krauss's figure is from a dried specimen, the differences noted may not represent actual structural differences, but merely a variation in configuration associated with the state of preservation. A careful examination of the type of *O. bramina* alone can establish or reject this synonymy.

Oligotoma rochai Navás, 1917, *Ent. Mitteilungen*, vi, nos. 7–9, p. 281.—There can be little doubt that Krauss (1917) is correct in referring this species to *O. latreillii* (recte *O. saundersii*), though Navás's figure (fig. 17) differs appreciably from his own verbal description and from the true structure of *O. saundersii*. This is of no significance, as a comparison of many of Navás's figures with the specimens from which they were made (e.g. *Oligotoma albertisi*, Museo Civico di Storia Naturale, Genoa; *Dihybocercus spinosus*, Musée du Congo belge, Tervueren) indicates that little importance can be attached to any of his figures.

Oligotoma inaequalis Banks, 1924, *Bull. Mus. Comp. Zool. Harvard*, vol. 65, no. 12, p. 421.—The type, in the Museum of Comparative Zoology, Harvard University, proved on examination to be a normal specimen of *O. saundersii*. Banks (l.c.) writes: 'The genitalia are similar to *O. insularis*, but the second joint of the left cercus is much longer than this joint in the right cercus. Length of body 7·5 mm., of forewing 6 mm. Larger and darker than *O. cubana*, and with an extra pale line in the wings.' Minor variations in the lengths of the segments of the cerci frequently occur as individual aberrations, and variations of considerable degree sometimes occur, such as in a specimen figured by Krauss (1911, Pl. ii, fig. 9E; the author has seen a similar aberration in a specimen

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from Honolulu). The type of *O. inaequalis* shows relatively only very slight asymmetry in this respect, and this cannot be considered of taxonomic importance. In colour and size the specimen falls well within the normal range for *O. saundersii* (syn. *O. cubana*), and there is in fact no extra pale line in the wings.

Localities of Oligotoma saundersii.

Below is a summary of the distributional records of this species under its various pseudonyms. Only those based on mature males have been allowed, as other records can have no significance. Except for specimens re-examined by later workers, only records since the monograph of Krauss (1911) are listed, as the determinations of earlier workers cannot be evaluated.

Westwood's type: East India.

As *O. latreillii* (or *latreillei*): Bombay; Madagascar (the types of Rambur, 1842).—Davis (1936): Queensland: Brisbane; Townsville. New Caledonia: Noumea.—Enderlein (1910): Aldabra Isd.—Enderlein (1912): South Formosa; Madagascar; East Africa: West Pemba Id.; Dar-es-salam. South Brazil: State of Santa Catharina; Colombia: St. Jean; Cuba.—Friederichs (1923): Madagascar: Ilôt Prune; Tamatave; Fort Duchesne.—Friederichs (1934): Brazil: State of Sta. Catharina, Humboldt District. British East Africa: Chiromo (Nyasaland).—Menon and George (1936): India: Salsette Isd.; Ernakulam, Cochin State.—Mukerji (1935): India: Bombay Presidency; Central Provinces. Ceylon: Peradeniya.—Navás (1918*a*): Cuba; Brazil; Colombia (probably not original references).—Navás (1922): Brazil: Bahia.—Navás (1923*b*): Singapore; Mascate (? Muscat); New Caledonia: Noumea: Mozambique; Vallée du Pungoné (? R. Pungwe); French Guinea: îles de Los; Tonquin: Cho-gahn.—Navás (1928): Sumatra: Padang.—Navás (1929): Congo: Panga, Aruwimi; Luebo; Djamba, Bas Uelé; Kimbou, Kwango.—Okajima (1926): Southern Japan.—Rimsky-Korsakov (1914): Formosa: Anping; Alikang.

As *O. insularis*: Hawaiian Isds. (the types of M'Lachlan, 1883).—Perkins (1913): Hawaiian Isds.: Kauai; Oahu; Molokai; Maui; Hawaii.

As *O. cubana*: Cuba (the type of Hagen, 1885).

As *O. hova*: Madagascar (the type of de Saussure, 1896).—Krauss (1911): South Madagascar; French Guyana: St. Jean.

As *O. bramina*: Bombay, India (the type of de Saussure, 1896).

As *O. rochai*: Brazil: Ceará (the type of Navás, 1917).

As *O. inaequalis*: St. Croix, West Indies (the type of Banks, 1924).

New Records: In addition to types discussed in the synonymy, mature males of *O. saundersii* from the following localities have been examined by the author: *Californian Academy of Sciences, San Francisco*: Honolulu.—*Museum of Comparative Zoology, Harvard University*: St. Augustine, Trinidad, 10.5.35, N. A. Weber; Wiecsdale, Florida, 24.4.—, C. H. Paige.—*British Museum of Natural History*: Aldabra Isd., '08–9, J. C. Fryer; Ascension; Caia, Zambesi, 29.7.11, H. Swale; Ceylon, coll. Thwaites; Kaunakakai, Molokai, Perkins; Mts. Waimea, Kauai, Perkins; Zomba, Nyasaland, H. S. Stannus.—*Museo Civico di Storia Naturale, Genoa*: Bambili, Congo, 1907, coll. Ribotti.—*Museum d'Histoire naturelle, Paris*: Békily, S. Madagascar, A. Seyrig.—*Colombo Museum, Ceylon*: Warahamankada, Southern Province, 14.3.35.—*Macleay Museum, Sydney University*: Rockhampton, Queensland, and environs; numerous records, specimens collected by and received from Mr. W. J. S. Sloan.

from Honolulu). The type of *O. inaequalis* shows relatively only very slight asymmetry in this respect, and this cannot be considered of taxonomic importance. In colour and size the specimen falls well within the normal range for *O. saundersii* (syn. *O. cubana*), and there is in fact no extra pale line in the wings.

Localities of Oligotoma saundersii.

Below is a summary of the distributional records of this species under its various pseudonyms. Only those based on mature males have been allowed, as other records can have no significance. Except for specimens re-examined by later workers, only records since the monograph of Krauss (1911) are listed, as the determinations of earlier workers cannot be evaluated.

Westwood's type: East India.

As *O. latreillii* (or *latreillei*): Bombay; Madagascar (the types of Rambur, 1842).—Davis (1936): Queensland: Brisbane; Townsville. New Caledonia: Noumea.—Enderlein (1910): Aldabra Isd.—Enderlein (1912): South Formosa; Madagascar; East Africa: West Pemba Id.; Dar-es-salam. South Brazil: State of Santa Catharina; Colombia: St. Jean; Cuba.—Friederichs (1923): Madagascar: Ilôt Prune; Tamatave; Fort Duchesne.—Friederichs (1934): Brazil: State of Sta. Catharina, Humboldt District. British East Africa: Chiromo (Nyasaland).—Menon and George (1936): India: Salsette Isd.; Ernakulam, Cochin State.—Mukerji (1935): India: Bombay Presidency; Central Provinces. Ceylon: Peradeniya.—Navás (1918*a*): Cuba; Brazil; Colombia (probably not original references).—Navás (1922): Brazil: Bahia.—Navás (1923*b*): Singapore; Mascate (? Muscat); New Caledonia: Noumea: Mozambique; Vallée du Pungoné (? R. Pungwe); French Guinea: îles de Los; Tonquin: Cho-gahn.—Navás (1928): Sumatra: Padang.—Navás (1929): Congo: Panga, Aruwimi; Luebo; Djamba, Bas Uelé; Kimbou, Kwango.—Okajima (1926): Southern Japan.—Rimsky-Korsakov (1914): Formosa: Anping; Alikang.

As *O. insularis*: Hawaiian Isds. (the types of M'Lachlan, 1883).—Perkins (1913): Hawaiian Isds.: Kauai; Oahu; Molokai; Maui; Hawaii.

As *O. cubana*: Cuba (the type of Hagen, 1885).

As *O. hova*: Madagascar (the type of de Saussure, 1896).—Krauss (1911): South Madagascar; French Guyana: St. Jean.

As *O. bramina*: Bombay, India (the type of de Saussure, 1896).

As *O. rochai*: Brazil: Ceará (the type of Navás, 1917).

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Variability of Oligotoma saundersii.

The species as herein recognized is subject to variability in the taxonomically unimportant characters of size and colour, and in minor structural details. Total lengths of mature males range from 5 mm. to nearly 9 mm., and the general body colour from pale yellowish-brown to chocolate-brown. The specimen listed from Warahamankada, Ceylon, was exceptionally dark brown. The number of cross-veins in the wings is variable, and the structure of the tip of the outer process of the right hemitergite is subject to minute variations. Individual variations in the relative lengths of the segments of the cerci also occur.

It would serve no purpose to recognize any variations such as the above under varietal or subspecific names. Members of the species have undoubtedly been much spread over the face of the globe by man, and a detailed study of variation could not therefore be anticipated to yield geographic data of any value.

The female (v., e.g., Davis, 1936, 1938) possesses no characters of taxonomic importance.

Oligotoma humbertiana (de Saussure, 1896).

Embia humbertiana de Saussure, 1896, *Mitt. Schweiz. Entomol. Ges.*, ix, p. 353. Ceylon.

Krauss (1911, Pl. i, fig. 7C) has figured de Saussure's type (Geneva Mus.). It belongs to the species incorrectly known to Krauss (l.c.) and Enderlein (1912) as *O. saundersii* (or *saundersi*). Under this name it has been well figured by other workers in addition to the above, e.g. Rimsky-Korsakov (1914), Okajima (1926), Shao Wen Ling (1934) and Menon and George (1936). A detailed description is therefore unnecessary here. The figure of the terminalia (fig. 5) is from a specimen in the Museum of Comparative Zoology, from Mt. Makilling, Luzon, Philippine Isds. The species is immediately recognizable by the external subterminal tooth on the outer process of the right hemitergite ($10RP_1$). The process of the left hemitergite (10LP) ends typically in a small bifid claw directed outwards, although variations in this structure may occur (v., e.g., Menon and George, 1936, p. 90). The breadth of $10RP_1$ and the size and position of its subterminal tooth are somewhat variable; in this respect Krauss's figure of the type differs slightly from his figure of a specimen from Java (l.c., fig. 7), and from the figures of authors quoted above. The taxonomic recognition of such variations would serve no useful purpose, for the reasons noted under *O. saundersii*.

Specimens of *O. humbertiana* from Ceylon do not in general agree with Krauss's figure of de Saussure's type, as opposed to published figures of specimens from other countries, in the breadth of $10RP_1$. In the Colombo Museum there are specimens from various localities in Ceylon agreeing more closely with Krauss's figure 7 than with his figure 7C (the type).

It is unlikely that *Embia klugi* Rambur (1842, p. 313) refers to the insect under discussion here. It is given (with a query) in the synonymy of '*O. saundersi*' by Enderlein (1912). This synonymy is copied by Navás (1918*a*), without query. Both authors were referring to the insect now known to be *O. humbertiana*. Rambur's type, from Brazil, is stated by Hagen (1885, p. 197) to belong 'to the Museum in the Jardin des Plantes, in Paris', and Krauss (1911, p. 30) states that it is in 'Mus. Paris'. It is not now there, nor (fide Enderlein) in the de Selys collection, where others of Rambur's types are to be found.

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description and lack of detailed locality give no hope of identification, the species should be listed as permanently unrecognizable. It may be noted that Rambur's description of the appendages (cerci) is suggestive rather of a member of the series to which belongs *Olyntha brasiliensis* Griffith and Pidgeon (1831–2, ex Gray MS.). This series is certainly not related to *Oligotoma*, having R_{4+5} forked, and a new generic name is in fact required to replace *Olyntha*, which is a homonym of the earlier *Olynthus* Hübner (Coleoptera). This series includes *Olyntha ruficapilla* Burmeister, with which Hagen synonymized *Embia klugi*; it is not congeneric with *Embia* Latreille, as stated by Enderlein (1912).

Navás (1922) refers a series from La Paz, Lower California (Mexico) to *O. californica* (Banks, 1906). The series (in the Paris Museum) proved on examination to be *O. humbertiana*. The locality is a considerable distance from Banks's type locality (Los Angeles, California). The actual identity of *O. californica* will be dealt with shortly in a paper by Mr. E. S. Ross, of the University of California.

De Saussure's type locality is merely 'Ceylon'. The following records, based on mature males, exist under the name *O. saundersii* (or *saundersi*): Enderlein (1912): East Africa; Formosa; South Brazil; Ceylon; Singapore.—Friederichs (1923): Manila, Philippine Isds.—Friederichs (1934): Kagoshima, Japan; Dutch East Indies: Buitenzorg; Malang; Padang.—Krauss (1911): Singapore; Java.—Menon and George (1936): India: Bombay; Salsette Isd.; Ernakulam, Cochin State.—Mukerji (1935): Ross Isd., Andamans; India: Barkuda Isd., Madras Presidency; Burhanpur, Central Prov.; Calcutta; Medha, Satara District, Bombay Presidency; Rutnagiri District; Saugor, Central Prov.—Navás (1918*b*, 1923*a*): Manila, Philippine Isds.—Navás (1923*b*): India: Pondicherry; Malabar Coast. Seychelles: Mahé. Coroman de Gengi.—Navás (1928): Rio Cassine, Portuguese Guinea; Minhla, Birmania (Burma?).—Okajima (1926): Southern Japan.—Rimsky-Korsakov (1914): Anping, Formosa.—Shao Wen Ling (1934, 1935): Amoy University, China.

The following are the localities of mature males of *O. humbertiana* seen by the author: *Zoological Museum, Buitenzorg*: Java: Buitenzorg (several records).—*Museum of Comparative Zoology, Harvard University*: Philippine Isds.: Mt. Makilling, Luzon, coll. Baker; La Carloto Central, Occ. Negros, L. E. Uichanco, 3–1930; Manila, Banks.—*Muséum d'Histoire naturelle, Paris*: La Paz, Lower California, 1914, L. Diquet.—*Colombo Museum*: Ceylon: Bintenne, 10.28; Horowupotana, 9.10.24; Katagamuwa, Southern Province, 7–11.2.36; Marai Villu, N.W. Province, 24.3.33; Pulmoddai, Trincomali District.

The series from Borneo, from which Hagen (1885) redescribed *O. saundersii*, is in the Museum of Comparative Zoology, Harvard University. Hagen (l.c.) suggested the use of the name *O. borneensis* for this series, but in the same place decided to refer it to *O. saundersii*. It is not conspecific with either of the species here under consideration, but is the same as that now known as *O. vosseleri* (Krauss, 1911). This series will be considered in a later paper.

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The general colour of mature males of this species varies between pale and dark ferruginous; the total length from 5·5 mm. to 8 mm. The number of cross-veins in the wings is variable. Minor variations in the processes of the hemitergites have been mentioned above.

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Discussion.

The tropicopolitan distribution of *O. saundersii* and *O. humbertiana* is evident from the facts listed above. A third species, *O. nigra* Hagen, 1885 (syn. *O. mesopotamica* Esben-Petersen, 1929), is also very widespread; its distribution will shortly be dealt with in a paper by Mr. E. S. Ross. All three species probably owe their wide distribution in part to human transport. Apart from these species, the range of the genus *Oligotoma* (including *Aposthonia* Krauss, 1911; v. Davis, 1936) extends from East Africa through India and China to Southern Japan, the Philippines, the East Indies, New Guinea, Australia and Tasmania, and some islands in the Indian Ocean. This distribution is in contrast to previous concepts, as the genus was believed to be indigenous in all warm countries.

Certain species have been incorrectly referred to *Oligotoma*; the following require new generic names, being actually not directly related to *Oligotoma*: *O. hospes* Myers, 1928, Cuba; *O. hubbardi* Hagen, 1885, Florida; *O. ruficollis* de Saussure, 1896, Central America; *O. sulcata* Navás, 1923*b*, Galla Annia, Africa; *O. venosa* Banks, 1924, Cuba.

These will be dealt with in later papers, except *O. hospes* Myers, which is being dealt with by Mr. E. S. Ross.

The genus is exceedingly compact, showing few affinities to other members of the Order. The general form of the right hemitergite in the male, especially the structure marked on the accompanying figures as $10RP_2$, and the distribution of the main veins of the wings, remain constant throughout the component species. The family which the genus forms, the Oligotomidae, must temporarily be considered to contain no other genus. *Notoligotoma* Davis, 1936, and *Anisembia* Krauss, 1911, possess structural (venational) resemblances, but these can be regarded only as convergent. *Notoligotoma* belongs rather to a series of genera including *Burmitembia* Cockerell, 1919, *Embonycha* Navás, 1917*a*, *Metoligotoma* Davis, 1936, and *Ptiloceremhia* Friederichs, 1923 (cf. Davis, 1938, p. 267, footnote 2); *Anisembia* rather to a series including '*Oligotoma*' *hospes* Myers. Whether, as Krauss (1911) considers, *Haploembia* is referable to the family Oligotomidae is very problematical. It certainly possesses a long outer process to the right hemitergite, but the remainder of this hemitergite is not otherwise very close in structure to its homologue in *Oligotoma*. Another point of similarity lies in the left cercus, whose first segment always lacks nodules. Those species referred to *Haploembia*, which have nodules on this segment (e.g. *H. capensis* Esben-Petersen, 1920) are rightly referable to *Dictyoploca* Krauss, 1911 (sensu Rimsky-Korsakov, 1927) rather than to *Haploembia*. In its other characters, e.g. tarsal bladders, *Haploembia* differs markedly from *Oligotoma*, and as *Haploembia* is entirely wingless it is impossible to decide its affinities to *Oligotoma* on the important character of venation.

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to the following for their very generous action in forwarding types and other specimens for examination by me at the British Museum: Dr. Oscar de Beaux, of the Museo Civico di Storia Naturale, Genoa; Dr. P. Revilliod, of the Muséum d'Histoire naturelle, Geneva; and Dr. H. Schouteden, of the Musée du Congo, Tervueren, Belgium. I wish to acknowledge also the co-operation of Mr. E. S. Ross, of the University of California, with whom I was able to conduct many profitable discussions on general procedure in the taxonomy of the Order. Finally, I would convey my appreciation to the authorities of the University of California for granting all facilities in the use of their excellent library, a part of the work without which the remainder could have been of little significance.

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Addendum.

P. 185, line 15, *after* Dar-es-salam, *add* Lindi, Morogoro. Cameroons: Garua; Rei Buba.

P. 187, line 34, *after* Banks, *add* Surigao, Mindanao, coll. Baker. Formosa: Rokki, 15.6.32, coll. L. Gressitt. India: Bhadravate, Mysore, coll. P. S. Nathan.

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